

CLAIMS

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 1. A lining for a furnace the lining having insulating material attached to an inside wall of the furnace, the insulating material in use having a hot face which faces inwardly of the furnace and a cold face at or adjacent the furnace wall, characterised in that a protective element is provided at least partially to cover the hot and/or the cold face, the protective element being secured relative to the face by a securing means which co-operates with a member which is embedded in the insulating material.

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 2. A lining according to claim 1 wherein the securing means includes a headed fastener, a shank of which co-operates with the embedded member.

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 3. A lining according to claim 2 wherein the shank of the headed fastener has provided thereon, a screw thread, and the embedded member includes a correspondingly opposite screw thread with which the shank is in use engaged.

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 4. A lining according to claim 3 wherein the shank of the headed fastener passes through a passage of the protective element into co-operation with the embedded member.

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 5. A lining according to any one of claims 2 to 4 wherein the protective element is provided at the hot face, and the headed fastener is made at least substantially of a ceramic material.

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 6. A lining according to any one of claims 1 to 3 wherein the embedded member includes an integral shank or is adapted to have a shank secured

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thereto, and the securing means is engageable with the shank to secure the protective element to the hot face.

7. A lining according to claim 6 wherein one of the securing means and the shank passes through the protective element for securing to the shank or the securing means respectively.

8. A lining according to any one of the preceding claims wherein the protective element is of plate-like configuration.

9. A lining according to any one of the preceding claims wherein the protective element is made at least substantially of one or more of a ceramic material, a blanket of silica free insulation, a high-temperature resistant textile material, and a higher temperature resistant high alumina insulation that other insulation material of the lining.

10. A lining according to any one of the preceding claims wherein the furnace lining includes a plurality of individual blocks or modules of insulating material, each attached at the inside wall of the furnace, each module including a ceramic blanket which is folded to a block-like shape with the folds extending transversely to the furnace wall.

11. A lining according to claim 10 wherein the member which is embedded in the lining is embedded in at least one of the individual blocks so as to extend generally transversely to the folds.

12. A lining according to claim 11 wherein the embedded member is embedded in the lining by being forced into the lining material and then being rotated.

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13. A lining according to claim 12 wherein the embedded member is generally elongate or has a generally elongate part or parts.

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14. A lining according to claim 13 wherein the lining includes a ceramic blanket which is folded into a block-like shape, with the folds extending transversely to the furnace wall and the embedded member is forced into the insulating material with an elongate axis thereof or of the elongate part in an orientation generally aligned with the folds and is then rotated generally about an axis which is transverse to the elongate axis so that the elongate axis extends generally transverse to the folds.

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15. A lining according to claim 13 or claim 14 wherein the embedded member is of a single plate or multiple plate-like construction and is made of a material which is sufficiently strong to resist pull-out forces.

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16. A lining according to any one of the preceding claims wherein the protective element includes a plurality of layers which may or may not be bonded together.

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17. A lining according to any one of the preceding claims wherein the protective element is secured relative to the hot or cold face of the lining by adhesive cement in addition to the securing means.

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18. A lining for a furnace the lining including insulating material attached at an inside wall of the furnace, the insulating material in use having a hot face which faces inwardly of the furnace and a cold face at or adjacent the furnace wall, characterised in that a protective element is provided at least partially to cover the hot-and/or the cold face, the protective element being secured relative

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to the face by means including a headed fastener, a shank of which co-operates with a member which is embedded in the insulating material.

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19. A lining for a furnace having insulating material attached at an inside wall of the furnace, the insulating material in use having a hot face which faces inwardly of the furnace and a cold face at or adjacent the furnace wall, characterised in that a protective element is provided at least partially to cover the hot and/or the cold face, the protective element being secured relative to the face by means including a member which is embedded in the insulating material and a securing means which is attached to a shank which is integral with the embedded member or is attached to the embedded member, the shank or the securing means passing through the protective element into engagement with the embedded member or the securing means.

20. A furnace lining substantially as hereinbefore described with reference to and as shown in the accompanying drawing.

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21 A method of lining a furnace wall including the steps of attaching insulating material at or adjacent a wall of the furnace, the insulating material in use having a hot face which faces inwardly of the furnace and a cold face at or adjacent the furnace wall, characterised in that the method includes embedding in the insulating material, a member which is adapted to co-operate with a securing means, providing a protective element at least partially to cover the hot and/or cold face, securing the protective element to the face by attaching the securing means to the embedded member.

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22. A method according to claim 21 wherein the securing means includes a headed fastener, the method including inserting a shank of the headed fastener

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through the protective element into the insulating material so that the shank may co-operate with the embedded member.

23. A method according to claim 22 wherein the shank of the headed fastener co-operates with the embedded member by rotating the shank relative to the embedded member so that a screw thread of the shank engages with a corresponding screw thread of the embedded member.

24. A method according to any one of claims 21 to 23 which includes inserting the shank of the fastener through an opening preformed in the insulating material, and into co-operation with the embedded member.

25. A method according to claim 21 which includes attaching a shank to the embedded member, and engaging the securing means and the shank to secure the protective element to the hot and/or the cold face.

26. A method according to claim 21 wherein the embedded member is embedded in the insulating material by forcing the member into the insulating material and then rotating the member so that the member may cut or divide the insulating material and be anchored therein.

27. A method according to any one of claims 21 to 26 wherein the furnace is modular having a plurality of modules or blocks of insulating material, and the method being characterised in that a substantial part of the furnace wall is covered by a plurality of protective elements each secured at the hot and/or the cold face of the insulating material to at least one individual module, by means including a securing means which co-operates with a member which is embedded in the insulating material.

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28. A method according to claim 27 where dependent on claim 26 wherein the method includes inserting the member to be embedded when in an orientation generally aligned with the folds and then rotating the member so that the member extends transversely to the folds.

29. A method according to claim 26 or claim 28 wherein the member to be embedded includes a shank and the member is rotated by using the shank as a tool.

30. A method according to claim 26 or claim 28 wherein the member is rotated using a tool which co-operates with the member and is subsequently removed from the insulating material.

31. A method of lining a furnace wall including the steps of attaching insulating material at or adjacent the wall of the furnace, the insulating material in use having a hot face which faces inwardly of the furnace and a cold face at or adjacent the face wall, characterised in that the method includes embedding in the insulating material, a member which is adapted to co-operate with a shank of a headed fastener, providing a protective element at least partially to cover the hot or the cold face, securing the protective element to the face by inserting the shank of the headed fastener through the protective element into the insulating material, so that the shank may co-operate with the embedded member.

32. A method of lining a furnace wall including the steps of attaching insulating material at or adjacent the wall of the furnace, the insulating material in use having a hot face which faces inwardly of the furnace and a cold face at or adjacent the furnace wall, characterised in that the method includes embedding in the insulating material, a member which is adapted to co-operate

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Cont. → with a securing means, providing a protective element at least partially to cover the hot or cold face, securing the protective element to the face by attaching the securing means to the embedded member such that the protective element is retained between the securing means or a part thereof, and the face.

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Sub A21 → 33. A method of repairing a lining of a furnace made by the method of any one of claims 26 to 32 including the steps of removing the securing means, removing the protective element or a layer of the protective element, and securing a replacement protective element or protective element layer, to the face of the insulating material by a securing means which co-operates with a member which is embedded in the insulating material.

34. A method of repairing a lining of a furnace substantially as hereinbefore described with reference to the accompanying drawings.

Sub B37 → 35. A method of improving the thermal resistance of an existing furnace lining having insulating material attached to an inside wall of the furnace, the insulating material in use having a hot face which faces inwardly of the furnace and a cold face at or adjacent a furnace wall and the lining having a member which is adapted to co-operate with a securing means the method including providing a protective element at least partially to cover the hot or cold face, the protective element being secured relative to the hot face by the securing means co-operating with the member which is embedded in the insulating material.

36. A method of improving the thermal resistance of a furnace lining substantially as hereinbefore described with reference to the accompanying drawings.

37. ~~Any novel feature of novel combination of features disclosed herein and/or as shown in the accompanying drawings.~~

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